

THE RELATION BETWEEN
AFFECTIONS OF THE TEETH
AND OF THE EYES.

BY
DR. N. FEUER,
(Of Budapest).

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P R E F A C E.

LITTLE apology seems to be needed for bringing under the notice of the profession an English version of Dr. N. Feuer's pamphlet upon the connection between teeth and eye affections. His logical and comprehensive treatment of a subject which bristles with difficulties is in itself a sufficient justification for the appearance of the present publication.

In order to do justice to the spirit of Dr. Feuer's remarks, the original text has been treated with considerable freedom. The translation, therefore, can scarcely be regarded as a literal one.

My friend, Dr. JAMES TAYLOR, has been good enough to revise the proof-sheets, and I am indebted to him for many valuable hints.

Lastly, the fact should be mentioned that the work has been undertaken with the consent and help of Dr. Feuer himself.

SYDNEY STEPHENSON.

Welbeck Street, W.

July, 1894.

THE RELATION BETWEEN AFFECTIONS OF THE TEETH AND OF THE EYES.

By DR. N. FEUER, (of Budapest).

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There is a common idea that mischief can spread from the teeth to the eyes. Every inflammation of the latter occurring at the time of dentition* is popularly assigned to the teeth; and it is thought that the "eye-teeth" are especially dangerous, not only during their eruption, but also during their decay. The modern physician has always a sceptical smile when this time-worn belief is mentioned. Yet the important nervous and vascular ties binding together teeth and eyes, show clearly enough that a certain pathological relationship between those organs is no more than might be expected; while the knowledge we possess concerning reflex

* "Children are frequently distressed with sore eyes while teething, and the ophthalmia induced seldom subsides until the pain in the gums be removed. This effect is in part the result of sympathy, but is chiefly occasioned by irradiation communicated directly to the eye by the maxillary branch of the fifth pair of nerves. Even among grown up persons, the irritation of a carious tooth not infrequently induces pain and inflammation in the eye of the affected side." (A Treatise on the Varieties and Consequences of Ophthalmia, by Arthur Edmonston, M.D., 1806, page 208) Trans.

affections in other parts of the body must incline us to a belief in the reality of such a connection. In point of fact, altogether apart from the numerous earlier communications, a considerable amount of literature has made its appearance in modern times upon this subject. These cases, despite their incompleteness in some instances, cannot be altogether ignored, because of their number, and also because of the high scientific position of some of their authors. The connection, however, is only one-sided, i.e. diseases of the teeth may well give rise to affections of the eye, but the reverse process has not been recorded hitherto. Considering the enormous number of persons with diseased teeth, it is somewhat singular that affections of the eye are not more frequently observed. Anyhow, such cases, by reason of their great importance, should have more attention paid to them than has been done up to the present time, a remark that applies to dentist and to oculist alike.

It would be as useless as well as a barren undertaking, to review here the whole of the literature bearing upon the subject (of which Forster¹ remarked that it was more voluminous than profound), nor would our object be obtained by criticising the scientific value of those publications. It will suffice to lay before the reader a general survey ; to indicate to him the standpoint from which our own observations, and those gathered from other sources are to be judged ; and, lastly, to quote particular cases in explanation of our remarks.

In the course of the following chapters, an opportunity will be found to discuss the differential diagnosis between high-seated dental fistula, on the one hand, and fistula resulting from retro-bulbar abscess, dacryo-cystitis, periostitis and caries of the orbital margin, on the other.

The affections of the eye that follow upon diseases of the teeth may be divided into two groups. First, those affections

1. Graefe-Sacmisch Handb. d. ges. Augenhkld., iii. Bd., p. 72.

transmitted by continuity from the region of the teeth to the eyes or to their surroundings ; secondly, such diseases of the eye as are called forth reflexly.

FIRST GROUP : AFFECTIONS BY CONTINUITY.

This group is not only the more definite, but also the more serious. It has reference not so much to that common everyday appearance associated with dental periostitis of the upper jaw—where swelling of the cheek and eyelids is accompanied by collateral hyperæmia of the conjunctiva, marked by lacrymation and secretion—as to a far more serious condition, namely, cellulitis of the orbit. The latter affection sometimes makes its appearance after dental manipulations. The purulent, possibly septic condition thus brought about in the upper jaw creeps upwards to the orbit, where it excites inflammation of the retro-bulbar cellular tissue, a process followed in most cases by destruction of the eye. When we add to this, that life itself may be placed in jeopardy, the importance of this group, in so far as the dentist is concerned will be sufficiently indicated.

As already stated, the leading symptom is suppuration, which spreads to the periosteum of the orbit from the tooth-socket or from the alveolar process of the upper jaw. The process passes through the lymph vessels (Pagenstecher) or through the veins, that is, it spreads by a lymphangitis or by a phlebitis. Two courses are open : (1) directly along the periosteum of the cheek, (2) through the antrum of Highmore. As regards the latter, the infection-germ may gain access to the maxillary sinus either through the alveolar veins, or by means of an open communication between alveolus and antrum. From antrum to orbit, two paths are available. The first way is by a large venous branch, which perforates the outer wall of the superior maxilla to discharge itself directly into the vena ophthalmica-facialis.

From there the phlebitis can pass upwards to the sphenomaxillary fossa, and, by means of a venous anastomosis, through the inferior orbital fissure to the ophthalmic veins, inferior and superior. The second way out of the antrum is by a small vein, which bores through the lower wall of the orbit, and opens directly into the vena infraorbitalis or into other veins from which the vena ophthalmica inferior arises. (Vossius,² compare also Parinaud.³)

Incidentally we may here note that primary inflammation of the maxillary sinus, or inflammation originating from the nasal mucous membrane, can give rise to retro-bulbar cellulitis. This was so in cases reported by Brück⁴, (who certainly did not examine the teeth closely,) and by Herman Pagenstecher⁵.

Because suppuration is transmitted from alveolar process to antrum, it does not necessarily follow that septic mischief is present. Even a so-called simple suppuration, if the pus finds no free vent, can bring us face to face with this grave emergency. In those instances where retro-bulbar inflammation made its appearance before extraction of teeth (two-thirds of the published cases), we must regard sepsis as at least doubtful. Again, although it is true that in most of the recorded cases the corresponding half of the face was swollen, yet in numerous other instances this bridge of connection between the teeth and the orbit was absent, or at least not obvious. This was so in both the cases recorded by Pagenstecher⁵, the first of whose observations possessed especial interest, since the primary dental affection was so slight as scarcely to admit of diagnosis. Extraction of the affected

2. Graefe's Arch für Ophth Bd. xxx., Abth., 3, p. 157.

3. Parinaud, Arch. gen. de Med., Juin, 1880, und Deutsche Monatschrift für Zahnheilk., 1884, p. 137.

4. Brück. Casper's Wochenschr. für geo. Heilk., 1851, p. 129.

5. Pagenstecher. Knapp's Arch. für Augenheilk., 1884, p. 138.

tooth, undertaken in opposition to the views of the dentist, and at the express wish of Pagenstecher, was followed, however, by a speedy improvement in the retro-bulbar inflammation.

Violent inflammation following tooth-extraction is to be ascribed to septic infection so much the more readily as retention of matter is here out of the question. Further, the dentist cannot always be held responsible for the infection, seeing that the patient himself may have introduced septic germs into the wound by various ways, for example, by fingering or by food. Moreover, as hinted before, in only a third of the published cases had extraction taken place before the retro-bulbar disease was evident. The time that elapsed between the two events ranged from two to ten days. In only a single case recorded by Sovet,⁶ did periostitis, present before operation, protract itself so long after extraction of the tooth that two months passed before inflammatory exophthalmus declared itself. It should be noted that fragments of the maxilla were removed during extraction of the tooth.

The exophthalmus observed in Sovet's case was explained by a periostitis of the orbit leading to retro-bulbar cellulitis. Pus escaped both from orbit and from nose ; at the end of a month a sequestrum, as large as a pea, was thrown off, and a piece of dead bone came from the nose ; finally the eye atrophied as the direct result of the disease. We may remark, however, that the inflammatory process seems to have been of a chronic nature.

In those instances where apart from operative interference, the dental condition caused cellulitis, extraction of the affected tooth invariably brought about a rapid improvement in the retro-bulbar trouble, as well as a speedy retro-

6. Sovet. *Ann. d' ocul.* 1847. Bd. xviii, p. 159.

gression of the associated exophthalmus. Where external swelling did not already betray the existence of an alveolar abscess, its presence was confirmed on subsequent extraction of the teeth.

Most of the recorded cases of cellulitis terminated in supuration behind the eye. The pus collected either in the lower lid or in the palpebral fissure; or, by perforation of the lamina papyracea, it passed into the nose, and eventually into the maxillary sinus. Sometimes (as in Sovet's case) dead bone came away from the maxilla, as well as from the orbital wall.

After timely removal of diseased teeth, retro-bulbar inflammation, in a few instances, subsided without either formation of pus or damage to sight.

The formation of matter always involves a serious risk to the eye. Thus in nearly one half of the recorded cases, cellulitis was followed by white atrophy of the optic nerve and total blindness, a result that has also been observed not infrequently as a sequel to facial erysipelas. Nor is the tale complete; for inflammation may extend over the retina to the uveal tract, and thereby lead to complete shrinking of the eye.

In Brück's case, which has been mentioned before, the sight, altogether lost at first, returned to some extent later, although it was not sufficient for the estimation of distances.

But the evil consequences entailed by retro-bulbar cellulitis are not yet exhausted; death itself may result from extension of the process, especially of the phlebitis, to the membranes of the brain. Indeed, among some 26 cases, death has been recorded no less than four times (Fischer,⁷ Teierlink⁸ Foucher⁹, and Snell.¹⁰)

7. Fischer. *Klin. Unterricht in der Augenheilk.* Prag. 1832, p. 9.

8. Teierlink. *Ann. de la Soc. de Med. de Gand*, Janv. 1848, & *Anns. d'ocul.*, 1848, p. 92, 151, 198.

9. Foucher. *Gaz. des Hôp.*, 1856, p. 35.

The treatment of cellulitis is to be conducted in accordance with ordinary surgical principles. If a tooth has been extracted, the wound should be thoroughly disinfected; any collection of pus in the alveolar process, on the jawbone, or in the antrum, must be evacuated, the opening being kept patent and sedulously rinsed out with an active antiseptic: loose pieces of bone should be removed at once. A diseased tooth still in its socket should be extracted forthwith, and the sooner that is done, the more rapidly will cellulitis subside. The

10. Snell. *The Lancet*, 1890, p. 127.

1. Snell's case of fatal cellulitis is so well recorded as to warrant more than mere passing mention. Its material facts are these.

On January 24, 1890, Miss B, 14 years of age, had the three roots of the first superior right molar and the first inferior left molar extracted. Fœtid pus escaped after removal of the former tooth. Five days later the second superior right bicuspid and the first inferior right molar were removed. Acute periodontitis of the bicuspid was noted.

On February 2, 1890, the weather being cold at the time, the patient went for a drive in an open trap; on the next day she resumed school work, from which she had been absent for two weeks. Headache and vomiting set in upon Feb. 6th.; and three days later, a swelling was noticed, involving the region of the right eye.

Mr. Snell saw Miss B. for the first time on Feb. 16, when her condition was as follows: considerable œdema of the lids of the right eye and of neighbouring parts; right eyeball decidedly protruded; conjunctiva swollen, particularly at the outer commissure. Severe pain was complained of. A diagnosis of acute cellulitis was made.

On Feb. 18, fluctuation was found to be present at the lower and inner part of the right orbit, and a large quantity of pus was evacuated through an incision beneath the inner third of the lower eyelid. A drainage tube was inserted into the wound. A probe disclosed the existence of bare bone in the depths of the orbit. Next day patient free from pain, and eyeball in normal position. Upon the same night, however, Miss B. became worse; vomiting set in, and occurred whenever she attempted to swallow anything. Next morning, she complained of great pain at the back of the head, which was retracted. She became comatose the same evening, and died next day, (21st) at 3 p.m. A post-mortem examination was refused, but Snell noted that "the condition of orbit was quite satisfactory; the œdema and swelling of lids and other parts had disappeared, the eyeball had returned to its natural position." (*Trans. ophth. Society*, Vol. X, p. 51 et seq.) *Trans.*

2. The English reader will find a full account of Fischer's Case in Mackenzie's "*Treatise on the Diseases of the Eye*," 4th edition, page 303. et seq. *Trans.*

special treatment of the latter affection devolves of course upon the ophthalmic surgeon, whose endeavour it should be to evacuate deeply-seated collections of pus at the earliest possible moment, and to seize and remove dead bone as speedily as possible. The fate of the eye, nay even life itself depends upon the rapid resolution of the retro-bulbar inflammation.

It would be absurd, of course, to ascribe to a dental origin every inflammation of the orbit that might chance to appear in those with diseased teeth. We know that idiopathic cellulitis generally runs its course in two or three weeks. Suppose, now, that late in the history of such a case, one or more decayed teeth were removed, and that the operation was followed by speedy convalescence. It might be concluded that, under such circumstances, the carious tooth stood in causal relation to the cellulitis, an inference, however, that would not be justified by the facts. In the absence of an obvious connection between the affection of the teeth and that of the orbit,) be it in the form of a swelling of the cheek, or of an abscess of the antrum,) then suppuration at the root of the incriminated tooth must at the least be demonstrated, in order to maintain with some show of reason that there is a real relation between the two conditions. As a matter of actual practice, however, one would, even on mere suspicion, extract any teeth that might appear to be implicated.

In addition to the authors already quoted, the following report upon retro-bulbar inflammation of dental origin: Galenzowsky¹¹, Decaisne¹² (two cases), Tetzner¹³, Gaine¹⁴,

11. Galenzowsky. Arch. gen. de Med. Bd. xxiii., p. 2161. Paris, 1830.

12. Decaisne. Bull. de l'acad. royale de Belg, 1853, Bd. xiii., p. 53.

13. Tetzner. Bericht der Wiener Unwersitäts-Augenlinik, 1863, p. 116.

14. Gaine. British Med. Journal, 1865, p. 683.

Williams¹⁵, Salter,¹⁶ (who also quotes a case by Pollock), Delestre¹⁷, Galezowski, Le Fort,¹⁸ Sammelsohn¹⁹, Weinberg²⁰, Vossius²¹, and Hern (see Collins)²²

A fistula of dental origin is occasionally met with in or about the lower margin of the orbit, and under such circumstances it becomes of great practical importance to distinguish it from fistulæ resulting from local periostitis or caries, or from disease of the lacrymal sac. We may devote some little time, therefore, to the differential diagnosis of these various conditions.

Given a fistula in the temporal half of the inferior orbital margin, the distinction must be made between a dental and a local origin. In the latter case, a probe, passed through the opening, will strike upon a hard rough base, which bars further progress. It is only when the carious spot is deeply seated in the orbit that the probe passes through the fistula and travels backwards for a variable distance; the eyeball moreover, will probably be protruded in such a case. In dental fistula, on the other hand, the probe takes a downward direction, while the finger, stroking from below upwards, causes pus

15. Williams. Dental Cosmos, 1867 (auch bei Wedl., Pathol. der Zahne, 1870, p. 169.)

16. Salter. Med. Chir. Transactions, 1863. Guy's Hospital Reports, 1867. (Compare Wedl., p. 170)

17. Delestre. Bull. de l'acad, de Med, 1869 p. 112; Des Accidents causés par l'extraction des dents, Paris, 1870, p. 87, & Gaz. Med. de Paris, 1871, p. 150.

18. Le Fort. France Medic. 1876, Nr. 44, p. 357.

19. Sammelsohn. Berliner klin. Wochenschr., 1877, p. 752.

20. Weinberg. Rec. d'ophth., 1882, p. 441, 677.

21. Vossius. Graefe's Arch. für ophth. Bd. xxx. Abth. 3, p. 157.

22. Collins. British Journal of Dental Science, April 15, 1891. Odont. Gesellsch. von Gr. Brit., April sitzung (see Correspondenzblatt für Zahnärzte, 1891, p. 262.

to exude from the fistulous aperture. Among other characteristics of orbital caries the following may be mentioned: it is of spontaneous origin, attacking for the most part weakly and scrofulous children. It generally lasts beyond the period of puberty, and often entails ectropion of the lower lid. Its favourite seat is the outer half of the lower margin of the orbit, (that is, the malar bone,) although two cases have been recorded in which caries attacked the upper margin of the orbit.

If, then, an adult, who manifests no signs of scrofula, of tubercle, or of obsolete syphilis, presents a fistula in the neighbourhood of the orbit, the possibility of a dental origin should be borne in mind.

Fistula proceeding from deeply-seated orbital mischief may be excluded, if (a) the eyeball possesses free movement, (b) the globe be not pushed forwards, and (c) when the probe strikes upon an obstacle in front, instead of passing backwards, into the soft tissues of the orbit.

It seems scarcely necessary to add that in making the differential diagnosis attention should be paid to the following points: (1) the history, (2) the presence or absence of swelling of the cheek, and (3) the results elicited by careful examination of the teeth.

An instance of dental fistula in the temporal half of the orbital ring has been recorded by C. Williams.²³ The facts were these. An alveolar abscess, which had arisen after extraction of an upper molar tooth, discharged itself on the lower margin of the orbit, under the outer commissure of the eyelid. The pus had burrowed under the zygomatic process and the temporal muscle, and was prevented from pointing in the temple not only by those structures, but also by the strong temporal fascia. It had then passed through the spheno-maxillary fissure into the outer

23. Williams. Dental Cosmos, 1887,

and lower part of the orbit, to discharge by means of a fistulous opening in the position described. Distinctly marked exophthalmus of the left eye was present, along with serous chemosis of the conjunctiva. After the pus had been evacuated by means of an incision in the temporal region, improvement speedily set in (cited after Wedl).²⁴

Caries, as stated before, attacks, generally speaking, the outer part of the orbital ring, whereas fistula of the lacrymal sac is seen towards the inner and lower orbital border. A fistula in the latter position, therefore, is due probably to lacrymal or to dental trouble, rather than to caries of the bone.

Sewill²⁵ records the case of a boy, ten years of age, who for several months had a constant discharge of matter from an opening near the inner canthus of the right eye, which aperture bore an outward resemblance to a lacrymal fistula. A probe, passed through the opening, however, reached downwards to a discoloured canine tooth, after extraction of which the fistula soon healed. Parinaud²⁶ records two cases, in children from five to six years of age, of fistula of the orbital margin, both of which were caused by carious teeth; he also describes two other cases, in adults, of fistula in the upper part of the lacrymal sac. As regards the former, it may be noted that inflammatory swelling of the cheek was absent. Further, after perforating the alveolus, the pus had not burrowed, as is usual, under the periosteum of the jaw-bone, nor had it passed along the maxillary sinus. It had in point of fact taken a path that may be explained by a reference to the development of the teeth.

At a certain period of development, the alveoli of the

24 Wedl. *Path. der Zähne*, 1870, p. 169.

25. Sewill. *Odontological Society of Great Britain*, 1869 and 1883, *Deutsche Monatschr für Zahnheilk*, 1884, p. 347.

26. Parinaud. *Arch. gen de Med.*, Juin, 1880, and *Deutsche Monats. für Zahnheilk*, 1884, p. 137.

permanent teeth are embedded in the anterior wall of the jawbone in such a way that their upper extremities reach the lower border of the orbital wall. These alveoli communicate with those of the milk teeth by an aperture, which, although narrow at first, later becomes wider, and is filled with nerves and vessels. Hence a large canal leads direct from the sockets of the milk teeth to the orbit. This is especially noticeable as regards the eye-tooth and the first molar. The further fact should be mentioned that communications often exist between individual alveoli. Pus, then, may reach the lower edge of the orbit by simply traversing this canal, and may thus lead to the formation of abscess, with or without necrosis of bone. Further, in one of the cases last mentioned a fistula and abscess in connection with a lateral incisor were established, without the intervention of a swelling of the gum or of the sinus referred to, for the pus in that instance followed a vascular channel, which, starting from the alveolus, especially of the canine teeth, runs upwards into the substance of the jaw, to end as a fine opening in front of the *sinus lacrimalis*. The canal sends out branches upwards and downwards, the former going to the orbital ring, the latter to the cavity of the nose, while inferiorly they proceed to the various alveoli. The existence of these canals may be readily demonstrated by the injection of fluid, and often by means of the probe.

Parinaud mentions another instance in which a dental simulated a lacrymal fistula (*La Revue Odontologique*, Mars, 1883; abstracted at length in the *Monatschrift für Zahnheilkunde* for 1884, page 137). A similar case has been observed by Jul. Scheff.²⁷

The latter author describes in detail the differential diagnosis between dental and lacrymal fistulæ, and, with his assist-

27. Scheff. Pester Med. Chir. Presse, 1882.

ance, we may contrast the leading symptoms of the two conditions.

In lacrymal fistula, following dacrocystitis, one finds:—

1. The fistula directly above the lacrymal sac, generally on the lower aspect of the internal palpebral ligament. The pus, however, may break through the wall of the sac, and insinuate itself beneath the skin along the margin of the orbit, but in that event it does not pass the middle line, while its path is marked by a livid swelling of the skin.

2. If the fistulous opening lie on the anterior aspect of the lacrymal sac, then a bulbous probe may be passed into a cavity, which, according to the presence or absence of dacrocystitis, may or may not give a soft feeling to the touch, due to the swollen mucous membrane; in caries of the lacrymal bone, it is possible to detect the presence of bare, rough bone beneath the sound. A fine probe introduced through the lower,—or better, the upper,—canaliculus, will strike against the bulbous sound previously passed into the lacrymal sac; if absolutely necessary for purposes of diagnosis, the upper lacrymal tube may be opened before a probe is introduced. In case the pus has burrowed some distance from the lacrymal sac, a probe introduced into the fistula will pass inwards and upwards towards the tear-bag, where it may be identified by means of the small probe passed through the upper canaliculus.

3. The secretion from a lacrymal fistula is not purulent, but glairy, like the white of raw egg, provided always that the dacrocystitis has been evacuated, and that there is no caries of the lacrymal bone.

4. Lastly, a fistula can be at once recognised as lacrymal when fluid, thrown into one of the canaliculi, emerges from it. Coloured liquid or boiled milk may be used for this purpose, and one need scarcely add that the other canaliculus should be compressed during the injection. Personally, I use a

hollow Bowman's probe, to the upper bulbous end of which a syringe is connected by means of india-rubber tubing.

A dental fistula, on the other hand, lies, according to Julius Scheff(l.c.), not exactly on the lower margin of the orbit but about $\frac{1}{2}$ cm. below it ; symptoms of disease of the tear-sac are absent ; the secretion is always purulent ; and an associated inflammatory swelling of the cheek is often observed.

Dental fistula, moreover, must be distinguished from (1) a local bone affection—which is, perhaps, seldom present, and (2) abscess of the antrum, that has undergone rupture. The diagnosis will be in favour of a dental origin if the probe passes downwards, an inference that will be decidedly strengthened if periostitis of the upper teeth be found. From a therapeutic point of view, it matters little whether one is dealing with a high-seated dental fistula or with a ruptured abscess of the antrum.

SECOND GROUP : REFLEX AFFECTIONS.

In the foregoing section, we have trodden the path of definite anatomical relations. We now, however, enter the region of the wonderful, in presence of which it will be difficult to conjure up sufficient sobriety and scepticism. If we are to believe the recorded cases (which far exceed in number those of the first group), no part of the eye, from the conjunctiva to the optic nerve, is exempt from disease thus reflexly produced, notwithstanding the fact that the incriminated teeth are often quite painless.

Independently of the earlier authors, Galezowsky and Power have in recent times interested themselves in this subject.

Galezowsky,²⁸ in his first communication on this subject, says that disease of the teeth may produce mischief in the eye, and *vice versa*. Violent neuralgia of the teeth is often met with in cases of iritis, of choroïditis, and of glaucoma, alto-

28. Galezowsky. Journ. d'ophth., 1872. Sur les affections oculo-dentaires.

gether apart from any dental affection. It has frequently happened that, in these circumstances, teeth have been erroneously and uselessly removed. On the other hand, affections of the eye, even blindness, are caused by extraction of the teeth. During dentition, the appearance of eye disorders, particularly of the phlyctenular kind, is often closely dependent upon that process ; and the frequent relapses stand in intimate relation with the presence of dental irritation. At the time of the first dentition, eye irritation can in many instances be allayed by incision of the gum.* Galezowsky professes to have frequently observed interstitial keratitis during the second dentition and in connection with it ; while during eruption of the wisdom teeth, a similar disease is said to occur. The innervation of the nasal duct, by the *nervus dentalis anterior*, explains the pains sometimes experienced in the molar teeth during catheterism of that passage.

In a later communication, Galezowsky²⁹ draws a distinction between affections of the eye proceeding from dentition and those that appear in consequence of dental caries. According to him, examination of the teeth should never be neglected in the treatment of diseases of the eye, and the removal of any disordered dental condition should always be aimed at. Galezowsky states, further, that under the influence of the *first*

* Ware, in his *Remarks on the Ophthalmy*, published in 1814 (5th edition), spoke emphatically on this and allied points. "It should not be forgotten," he wrote, "that an inflammation of the eyes is likewise one of the effects which are sometimes occasioned in children by difficult dentition ; and in cases of this kind neither internal nor external remedies can prove effectual for the cure of the ophthalmy, until the tension of the gums be taken off by thoroughly dividing them down to the teeth. In performing this operation, which is best done with a common gum fleam, I usually make two incisions, one perpendicular to the other, in order to be more sure that the wound may not close again afterwards over the teeth. In persons more advanced in years, I have also sometimes seen an ophthalmy accompanied, and perhaps caused, by a decayed and painful tooth ; the removal of which has been necessary, before the inflammation of the eye could be abated." (Trans.)

29. Galezowsky. Recueil d'ophth., 1885, p. 215-229, and 363-364.

dentition phlyctenular ophthalmia, abscess of the cornea, and so forth, may make their appearance. In connection with the *second dentition* the following diseases may be met with:—purulent keratitis, prone to relapse, and rebellious to treatment; interstitial keratitis, the cause of which is often erroneously ascribed to hereditary syphilis; and spastic contraction of the eyelids and of the facial muscles. As to the *third dentition*, it is claimed that relapsing purulent and interstitial keratitis may be induced.

Galezowsky claims that the following maladies stand in causal connection with carious teeth. (1) Reflex asthenopia, closely related to caries of the anterior molars. The disturbance of sight appears in a remarkable way, almost always immediately after cessation of the toothache, and it varies according to circumstances. Inflammation of the cornea, of the iris, and of the inner membranes, through the transmission of “a kind of ascending neuritis” by the ciliary nerves. Corneal abscess, running a chronic course and accompanied by periorbital pain and spastic muscular contraction, seldom arises. Yet Galezowsky describes irido-choroiditis, with loss of the affected eye and sympathetic disease of its fellow, in a case of dental disease. (3) Reflex dilatation of the pupil (Desmarres). (4) Blepharospasmus and cramp of the ocular muscles—affections that may be also produced by imperfectly fitting artificial teeth. (5) Exophthalmus from transmission of inflammation through the maxillary sinus, or, as noted previously, inflammation may pass upwards by the anterior surface of the maxillary bone. (6) Lacrymal trouble.

In *L'Art Dentaire*, (May, 1876), Galezowsky maintained his extreme views concerning the influence of dentition upon the eye. He asserted that the symptoms of Keratitis or of Conjunctivitis, that appear quite suddenly in childhood, are, as a matter of fact, due to difficult dentition, and not, as

most people suppose, to scrofula. Scarification of the gum, he added, had rendered him good service in such affections.

Nobody will be astonished, therefore, that, holding such views, Galezowsky observed in 1882, in nine months, out of 7776 cases of eye disease, 168 (that is, about two per cent.) to which he assigned a dental origin.³¹ In this connection the fact may be noted that, in 1849, Tavignot³⁰ had declared dental irritation to be the essential cause of phlyctenular eye affections. The latter he treated by watching over the condition of the gums, by the exhibition of counter-irritants, by quinine internally, by periodical purgatives, and, lastly, by a snuff composed of Pulv. Iridis* and Calomel. Tavignot deemed local treatment of the eyes quite superfluous.

Power³², in an address delivered before the Odontological Society of Great Britain, spoke in a similar sense to Galezowsky. Among other reflex affections of the eye, he specially instanced phlyctenular ophthalmia, the cause of which he not infrequently traced to decayed teeth.

Consonantly with the views of these two authors, Galezowsky at once proceeded to found a school, according to the tenets of which operative dental surgery was to occupy the first place in the treatment of phlyctenular maladies of the eye.

Before going further into the description of reflex eye disorders, we may, however, simplify the subject by dividing it into two sub-groups, viz. :—(1) Inflammatory affections, and (2) functional derangements.

(1) INFLAMMATORY AFFECTIONS :

That neuralgia of the trigeminus may produce photophobia, blepharospasmus, hyperæmia, and even considerable swelling

* A powder made of the Iris Germanica. (Trans.)

30. Tavignot. *Revue de therap. Med. Chir.*, 1871, p. 510.

31. Weinberg. *Rec. d'ophth.*, 1882, pp. 441, and 677.

32. Power. *Dental Cosmos*, 1881, p. 497, also *Med. Press and Circular*, 1883, pp. 458, and 479.

of the conjunctiva, is a fact very generally known. It can scarcely be considered as remarkable, therefore, that toothache, also, may induce a similar train of reflex events. In many published cases, indeed, where descriptions have been given of chronic or relapsing "inflammations of the eye," bad sight, and the like, which disappeared after extraction of teeth, it is probable that this sequence of symptoms was the subject of description. The association is as natural as it is unimportant ; unimportant for obvious reasons, natural because a more or less common nervous and vascular supply is present. For the rest, attention must be drawn to the anastomosis that exists between the *nervus lacrymalis* and the *ramus temporalis* of the *nervus orbitalis* (from the second branch of the 5th cranial nerve), and also to the fact that the first branch of the 5th cranial nerve (supplying the skin over the temple and the forehead, and certainly the cornea as well) is often more sensitive in toothache, by reason of which augmented lacrymation, dread of light, and more or less blepharospasmus may be excited (compare Hutchinson's first case and my own given later on). The active hyperæmia together with the irritating action of the tears will, it is easy to understand, combine to produce swelling of the conjunctiva, and thereby give rise to an appearance as of inflammation of the membrane.

Catarrh of the mucous membrane of the respiratory and digestive tracts is often noticed during the period of dentition. Under these circumstances, it is not astonishing that a true catarrh of the conjunctiva, with great swelling of the lids and copious secretion, is sometimes met with.

Furthermore, in children predisposed to phlyctenular affections of the eye, every irritation, which would in others produce a simple conjunctivitis only, entails the formation of herpetic efflorescences. Again, as a consequence of dental irritation, the symptoms of an already existing phlyctenular

conjunctivitis may be rendered more obstinate. But all this however, is a totally different thing from claiming that every phlyctenular inflammation of the conjunctiva may be traced to a dental cause. For that matter, thousands of such cases are treated successfully every year in ophthalmic clinics and elsewhere without the slightest attention being bestowed upon either the gums or the teeth.*

Granted that dental irritation may give rise to certain appearances in the conjunctiva, yet that admission does not involve a belief in the reality of such irritation causing purulent or interstitial keratitis, retinitis, or inflammation of the uveal tract or of the optic nerve. The teachings of modern pathology lend no support to the view that nerve irritation or nerve palsy can produce actual inflammation.

The trophic theory has lost its glory-cloud since pneumonia after section of the vagi has been recognised as traumatic in its origin, and the keratitis following division of the fifth cranial nerve as due to dessication of the cornea, in consequence of abolition of reflex winking.³³ The only instance of disturbance of nutrition from nerve irritation is that of Herpes Zoster, concerning which Cohnheim has observed that we shall do well to await further anatomical and experimental evidence before we base far-reaching conclusions on this isolated fact. On the other side, nobody has witnessed the hyperæmia resulting from section of the sympathetic

*In the matter of phlyctenular disorders it may be of some little interest to quote the opinion of Mr. Jonathan Hutchinson, who, nearly thirty years ago, wrote as follows: "In many of the cases of so-called 'strumous ophthalmia' in young children, in which small ulcers on the surface of the cornea, or near its edge are attended by great intolerance of light, lachrymation and pain, the use of the gum-lancet at once relieves the more urgent symptoms."—*Royal London Ophthalmic Hospital Reports*, Vol. iv., p. 383). Trans.

33. Feuer. Untersuchungen über die Ursache der keratitis nach Trigemini-nusdurchschneidung. (Sitzungsber. d. kais. Akad. Wissensch. in Wien lxxiv., Bd. 3, Abth., 1876. Compare also E. v. Hippel: Zur Aetiologie der kerat. neuro. paralytica in Graefe's Arch. f. Ophth. xxxv. 3, 1890.

pass over into inflammation (Mauthner). It is a striking fact, moreover, that in spite of several weeks duration, neuralgia of the supra-orbital nerve (which is more closely related to the eye than either the second or the third branches of the trigeminus) does not cause inflammatory affections of the globe, although lacrymation, photophobia, and hyperæmia of the conjunctiva are present during the attacks of pain, which commonly go on through the greater part of each day. It is also significant that, of all the recorded cases of dental reflex, there is hardly one that suffered from severe toothache; on the contrary, carious teeth or roots, which caused the patient little or no annoyance, were almost invariably the subjects of surgical interference.

By Power and other authors, however, reflex eye affections are represented as analogous with sympathetic ophthalmia. But ophthalmologists have altogether abandoned the idea that the latter disease is the result of a simple reflex proceeding from the affected eye. The process is at present regarded, on the evidence afforded by anatomical research, as creeping from one eye to the other by continuity of nervous structure; indeed, facts indicating its mycotic origin have been recorded by Deutschmann. Galezowsky's supposition of an "ascending neuritis" has not been demonstrated anatomically, and is therefore improbable. Besides having to pass a long way over the Gasserian ganglion, such neuritis would produce derangement of nutrition in the eye, as well as in the other regions of innervation, and eventually in the skin of the face. In fine, existing observations are not of such a kind as to warrant, in more than a small degree, a belief that keratitis and the like may be produced by dental irritation.

We may now pass forward to describe other affections, taking up the various disorders seriatim.

CORNEA.

Despite its striking and suggestive title, *Rupture de la Cornee par suite de l'extraction d'une dent*, Duval's case³⁵ can scarcely claim a place in this section. The clumsy extraction of a right upper molar was followed by fracture of the superior maxilla and damage to the trigeminus among other nerves. The eyes at once deviated from their normal axes; sight was lost; and taste and sensation in the tongue, as well as hearing, were abolished. Next day, sight returned to the left eye, but the right eye remained blind. On the same evening, the right cornea was noticed to be cloudy, and, notwithstanding treatment, it burst at the end of eight days from Neuro-paralytic Keratitis, which had pursued its usual rapid course. Manifestly, it would be an unwarrantable proceeding to speak of the foregoing case as an instance of a corneal affection due to disease of the teeth.

In Power's case³² also, a Keratitis Neuro-paralytica seems to have been present, since the cornea and the whole region supplied by the ophthalmic branch of the trigeminus were insensitive. It is true that after the extraction of several teeth a transient improvement set in; but the case terminated, some seven months later, in loss of sight, and the eye was eventually enucleated (compare Collins.)²²

With regard to the cases recorded by Keyser,³⁶ Galezowsky³⁷, Hern³⁸, Brunschvig³⁹, Albert and Colyer (see Collins²²), we may make the following remarks. Two points should make us careful before we place ulcerative keratitis and affections

35. Duval. *Annal. d'Oculist*, 1846.

36. Keyser. *The Dental Times*, October, 1870, E. Virchow-Hirsch's *Jahresbericht*, 1872, Bd. ii., p. 575.

37. Galezowsky. *Journ. et Recueil d'ophth.*, 1872, p. 111 and 606, 1874 p. 215 and 363, *L'Art Dentaire*, 1876, (compare *Deutsche Vierteljahrsschrift für Zahnheilk.*, 1876, p. 467) and *Progres Med.*, 1886 (Mai 22) and 1888 (Nr. 29).

38. Hern. *British Medical Journal*, Sept. 28, 1889.

39. Brunschvig. *Rec. d'ophth.* Juillet, 1887.

of the teeth in causal relation. First, the fact that the etiology of corneal ulceration is often most obscure, although the disease, it is true, heals, under ordinary symptomatic treatment, none the less readily on that account; secondly, that the great majority of people have something or other the matter with their teeth. Diseased teeth might be extracted from a patient whose corneal ulcers were already healing, but obviously in such a case the improvement could not be set down to the dental operation. On the other hand, it seems quite impossible that a purulent keratitis the regression of which was not yet byprepared by the formation of vessels, could at once be cured a dental operation, which would be necessary to prove a *nexus causalis* between the two matters.

Power (*loco citato*) himself brings into prominence the question as to how far dental irritation is capable of producing affections of the eye, and admits that the point is a knotty point to solve. By reason of the extraordinary frequency of dental trouble, scarcely anybody can be found—let him have eye disease or not—who possesses altogether sound teeth.

Toothache, as everybody knows, may induce irritability and sleepless nights; in a word, it is capable of depressing the vital powers to a considerable extent. This factor must not be lost sight of in suggestive cases; it possibly predisposes to corneal ulcer and hypopyon.

IRIDO-CHOROIDITIS.

Galezowsky (l. c. 1873, p. 227), cites a case of irido-choroiditis, his explanation of which is open to considerable question. A woman, 28 years of age, experienced, fourteen days after the extraction of three molars, violent headache, inflammation of the left eye, and complete loss of sight. Two years later (1873), she consulted Galezowsky, who found the left eye reddened, tender, and disposed to atrophy. As regards the right eye, sympathetic disease was present, as shown by immobility of the pupil, opacities in the vitreous

humour, and diminished tension. Notwithstanding the removal of some diseased teeth, sight steadily failed. Later, iridectomy was performed, an operation which succeeded in preserving a certain amount of vision.

Concerning this case we may remark that the affection which eventually induced phthisis bulbi and irido-choroiditis declared itself fourteen days after the dental operation. It appears, therefore, to have been independent of that procedure. Further, the toothache (for the relief of which the teeth were extracted) was probably a consequence rather than a cause of the irido-choroiditis and due to the diffusion of the ciliary pains (see end of this section). To be brief, Galezowsky's case by no means proves that the eye disease was a direct consequence of a reflex taking origin from the extraction wound. Indeed, the venous connection, described before as existing between the oral cavity and the orbit, might be taxed to explain such an occurrence in a much more natural way. Leaving aside retro-bulbar inflammation as a possible cause, such venous connection could certainly have furnished the connecting link between the two affections; or the irido-choroiditis, it is conceivable, might have resulted from the lodgment of an embolus directly in the eye. In the latter connection the following case described by Dimmer⁴⁰ is well worth notice.

Pain in a carious tooth lying in the left half of the inferior maxilla; after three unsuccessful attempts, the tooth was extracted. Two days later, these symptoms were observed: marked swelling of the gum and of the left cheek, which were painful; difficulty in swallowing; and pains in the neck. A fortnight after extraction of the tooth, rigors, recurring several times daily, set in. At the same time, the patient, thirteen years of age, noticed that the right eye saw as through a veil. Next day, the sight had quite

40. Dimmer. Wiener Med. Wochenschr., 1883, Nr. 9.

gone ; proptosis was present ; and the lids were red and swollen. Pus then broke through the sclera, and the eyeball commenced to shrink (*phthisis bulbi*). When Dimmer first saw the case, panophthalmitis was already subsiding, and he rightly identified the cause as of metastatic nature (pyæmia proceeding from the extraction-wound).

Faucheron⁴¹ and Brunshvig (*loco citato*) report a case of iritis, which resulted in rapid cure after removal of a diseased tooth. That, however, is scarcely sufficient evidence to show that the iritis depended upon the dental affection. We must bear in mind, moreover, that the pathogeny of as of corneal ulcer, is often most obscure.

Finally, Brunschvig relates the case of a man, 66 years of age, whose eye, blind from infancy, became affected with suppurative choroiditis. After the removal of three painful stumps, the disease greatly improved in one night.

GLAUCOMA.

In his monograph upon the treatment of glaucoma (1881, p. 12), Mooren, writes : " There are a large number of observations in which the continual irritation of a dental branch of the trigeminus led to the development of glaucoma." It is well known that Hippel and Grünhagen observed heightening of the intraocular pressure as the result of stimulation of the fifth cranial nerve ; and Mooren's statement is evidently founded upon the theory which assumes that glaucoma is due to hypersecretion, a view that in former times counted many adherents. Other authors, beside Mooren, have noted the association of glaucoma with toothache. Priestley Smith⁴², and Creniceanu⁴³, think that, when the anatomical conditions necessary for the production of glaucoma are already present

41. Faucheron. Rec. d'ophth., 1881, p. 145.

42. Priestley Smith. Glaucoma, London, 1879.

43. Creniceanu. Szemézzet, 1885, Nr. 5 ; Klin. Monatshl. für Augenheilkunde, 1886, p. 310, and Arköry's Diagnostik der Zahnkrankh, 1885 p. 349, u.s.f.

in an eye, then a violent odontalgia, together with its accompanying depression of mind, may give impetus to the actual attack. The glaucoma which often appears in an eye, when its fellow has been operated upon for that disease, may be explained in a similar way. The patient, confined to bed with bandaged eyes, becomes depressed, and consequently, an acute attack is excited in the second eye.*

Ureniceanu (*loco citato*) describes a case of glaucoma associated with toothache. After the performance of iridectomy, exacerbations of the pain took place. At first sight he inclined to the belief that the two affections were related, but careful enquiry convinced him that premonitory symptoms of glaucoma had been present for three years, during which period no dental trouble was noticed. Thus, the sight had failed, while haloes around lamp flames had been observed, and iridectomy had been proposed to the patient, but refused by him.

In a certain sense, this communication recalls Dimmer's case of Irido-choroiditis, already described in the foregoing pages. In both, careful investigation of the history alone preserved the authors from assigning the ocular affection to a dental cause; both show, moreover, how easily a false conclusion may be arrived at when the history (which depends to a large extent upon the intelligence and accuracy of the patient) leaves any loophole for error.

After all in regard to this matter we have to deal, not so much with theoretical questions, but rather with the practical treatment of glaucoma, a malady that calls for such serious

*It is a familiar observation that a patient confined to his room after the performance of unilateral iridectomy for glaucoma is apt to develop that malady in the second eye. The explanation usually advanced is that the pupil of the eye which has not been operated on becomes dilated in consequence of the surrounding darkness. Given a narrowed filtration-angle, such dilation of the pupil would be likely to precipitate an attack of glaucoma. The fact is widely known that all mydriatics, for example, atropine, cocaine, and homatropine, may bring about a similar result in predisposed eyes.—*Trans.*

and immediate attention. Power³² had a patient, a lady 32 years of age, both of whose eyes were operated upon for glaucoma, but without success. Two years before the onset of disease in the left eye, she had suffered severely from toothache, which was relieved by extraction of teeth. Power conceived the idea that, instead of performing iridectomy, it might be advisable in similar cases to have every tooth carefully and thoroughly examined by an experienced dental surgeon. "I would ask," he writes, "whether such a case is not adapted for the removal and replantation of teeth, if these, after extraction, were found to be sound?"

Redard's⁴⁴ case alone might be regarded as a fairly definite one. Its facts are as follows:—A woman of 28 suffered from glaucoma of the right eye, marked by considerable increase of tension. The left eye was normal. The patient, who was in excellent health, made no complaint of pain. The cause of the monolateral glaucoma was quite obscure. (Now remark what follows). Dr. Abadie performed sclerotomy twice, but with transient success only. Then the teeth were examined, and a very painful stump found upon the right side, the removal of which was followed by an immediate reduction in the tension of the eyeball. The report omits to state whether the recently made scleral wound was not reopened by the extraction, nor does it tell us whether the tension of the eye remained permanently low.

In contradistinction to the foregoing case, Javal⁴⁵ stated at the conference of the French Ophthalmological Society that he had witnessed the disappearance of previously existing odontalgia after an operation for glaucoma. This was obviously an example of ocular pain radiating to the teeth; and a similar explanation probably applies to many other

44. Redard. *Gaz. Med. de Paris*, 1886, p. 229.

45. Javal. *Congrès Médical*, 22 Mai, 1886.

instances in which it has been claimed that dental pain has given rise to glaucoma.

In the discussion that followed the reading of Collins' ²² paper, Morton Smale cautioned his hearers against coming to a hasty and premature decision.

Redner treated a patient with glaucoma, and thought that the origin of the disease lay in the irritation set up by several stumps. The latter were extracted, but, although a slight improvement was observed, it was of transient character only, and the disease became progressively worse. In a similar case, despite careful treatment directed to the teeth the eyes failed to improve.

Decaisne ⁴⁶ described a whole budget of eye diseases, which, according to him, were the result of dental affections. He also imposed the name "*dents oculaires*," not only upon the canine, but also upon the first molars, because of their alleged extraordinary influence upon the eyes. Decaisne relates an instance of the formation of cataract in a soldier, 21 years of age. As a sequel to extraction of a molar, an abscess made its appearance, which healed after four months treatment, leaving behind it, however, two scars upon the chin, which were firmly adherent to the adjacent bone. Later on, capsulo-lenticular cataract was discovered, which, if we may believe the soldier's statement, had developed during the after-treatment following removal of the tooth. The eye, it may be noted, was normal in all other respects. The soldier was discharged from the army by reason of his defective eye, and the serious scientific question of causation was regarded as solved by his statement.

Henry Sewill ⁴⁷ and Power refer to a case of cataract, believed to be due to dental irritation. Extraction of all

46. Decaisne. Bull de l'acad. royale de Belg., 1853, Bd. xiii., p. 53.

47. Sewill. Odont. Gesellsch. von Gr. Britain, 1868, & 1883, (5 Nov., Deutsche Monats. für Zahnheilk., 1884, p. 347.

the teeth (which was carried out by degrees), did not, however, hinder the further development of the disease.

OPTIC NERVE AND RETINA.

Apart from optic atrophy as a sequel of retro-bulbar inflammation, anatomical changes in the nerve or retina have been recorded once only, by Gill, ⁴⁸ who noted effusion into the latter structure, along with obscured arteries. This case, in which the anatomical condition of the retina does not appear to have been ascertained beyond all doubt, belongs, in our opinion, to the class of pure amblyopiæ, to which we shall refer hereafter.[‡]

In order to render this section complete, the fact must be mentioned that Guaglino ⁴⁹ professes to have observed detachment of the retina as a consequence of disease in the teeth and gums.

II. SUB-GROUP: FUNCTIONAL DERANGEMENTS

Even were we in a position to reject, *a priori*, the theory of reflex inflammation, yet we are bound to consider each theoretical argument in dealing with the mysterious region of neurology concerned with true functional disturbances. The knowledge that irritation proceeding from the intestine (helminthiasis) and from the genital organs (uterus) can summon into existence, reflexly, functional derangements of the eye, will prepare us to believe that dental irritation may have a similar effect.

Apart from the already-mentioned over-secretion of tears,

48. Gill. St. Louis Med. Journal, 1873, p. 301, & Deutsche Viertel-Jahrsschrift für Zahnheilk, 1873, p. 422.

49. Guaglino. Trattato delle Malattia interna dell'occhio, Milano, 1858, (see Cronicleau in Arkoy. Diagnostik der Zahnkrankheiten, 1885, p. 363. The original not available.)

the functional derangements may be regarded as examples of irradiation into (a) the optic nerve and retina, (b) the oculomotor nerve, and (c) the facial nerve.

(a) OPTIC NERVE AND RETINA.

Disturbances of the optic nerve and retina as a consequence of dental irritation have been vaguely described by the majority of authors as examples of "amblyopia," or of "amaurosis," without more precise details as to their essential nature. Indeed, information concerning the fields of vision, the colour perception, and, in many cases, the sharpness of sight even is conspicuous by its absence. Still, the loss of sight was often described as extreme, and in not a few instances amaurosis was stated to have been present. If we except certain cases where hyperæmia (the existence of which must be always regarded as problematical) was alleged to be present, the results of ophthalmoscopic examination were uniformly negative. The dental irritation (from caries or from roots sensitive to pressure only) was frequently of so trivial a nature that the patient was actually unaware of its existence. In a few cases, dulness of sight ensued rapidly after extraction of a tooth; in others, defective vision quickly disappeared after removal of painful or suspicious teeth. Clearly, then, one must first enquire whether hysteria or simulation, cured by the extraction of a few teeth, was not present in the latter case; whether amblyopia following extraction of teeth might be in the nature of a traumatic neurosis*. In this connection it is interesting to note that

* In my experience, instances of traumatic neurosis are not uncommon, at least among children. The following typical case came under my notice some short time ago. W. W., 12 years of age, knocked his right eye against a bedstead. When I examined the lad, some two years later, tonic spasm of the right orbicularis palpebrarum muscle was present, and the history was to the effect that, with occasional remissions, the eye had been tightly closed ever since the accident. On separating the lids forcibly, the eye was found to be free from redness or other morbid change. The treatment

the majority of patients were either women or children, who are prone (from various causes, such as deceit, epilepsy, desire for sympathy, and so forth,) to simulate ailments with great nicety. Eros ⁵⁰ reports fourteen examples of simulated disease in children, of which we may quote the last :

A girl, six years of age, was struck upon the left eye by her teacher, whereupon that organ became inflamed, and after the redness had disappeared, remained blind. Beyond an oblong scar upon the cornea, which could not materially interfere with sight, there was no discoverable disease. The tender age of the child seemed to be against simulation. Vidor, the ophthalmic surgeon to the Stephanie Children's Hospital, at Budapest, managed the case as follows. After the right eye had been bandaged, Vidor placed the child at the end of the room, then, stationing himself a few paces away, told her to come to him. The child followed the voice and took a few steps straight forwards. At that moment, however, Vidor stepped lightly aside. The child started, and remained standing and confused. As the suspicion of simulation was strengthened by the foregoing experiment, Vidor made further tests. The right eye being bandaged as before, he pretended that he was about to puncture the supposed blind eye with a lancet. The child appeared to have been prepared for this ; neither a wink nor a movement of the head betrayed fear of the thrust ; a slight trembling of the knees was the only sign that disclosed her agitation. The patient

was as simple as it was effective : the patient was told to open the eye, and to keep it open, a mandate that he immediately obeyed.

Now supposing that, instead of a mere psychical suggestion, one or more of the carious teeth which were actually present had been extracted, it is quite likely that a similar result would have followed ; in which event, another would have been added to the long list of cases assumed to be due to a dental reflex.—Trans.

50. Eros. "Concerning Simulated Diseases in Children." *Jahrbuch für kinderheilkunde*, 1884, p. 373.

was next subjected to ophthalmoscopic examination for a considerable time. Then a glass, *plus* 80, was held before her, and the child began to read the letters of Jaeger No. 1. continuing to do so even after the lens had been imperceptibly withdrawn from before her eye.* At this stage it was discovered that the child had been instructed to simulate blindness by her mother, so as to embarrass the teacher.

Before embarking upon a critical examination of some of the recorded cases, it will clear the ground if we specify certain sources of fallacy. In the first place, it is obvious that we cannot expect a patient suffering from spasm of the orbicularis and photophobia to attain full acuteness of sight; nor can we, with any show of reason, describe such a patient in such a condition as amblyopic. Secondly, ophthalmoscopic examination can be only partially carried out under such circumstances. Thirdly, as regards the field of vision, a healthy person not infrequently shows considerable differences between the results obtained by the perimeter on different occasions. Fourthly, as tests of sight are not always conducted by specialists, it may be pointed out that patients with catarrh of the conjunctiva—which, as we have already seen, is so common in painful diseases of the teeth—often complain of disturbance of sight, and are persuaded only with difficulty to read the test-types to their end.

Besides, apart from such subjective complaints, conjunctivitis may give rise to considerable though transient disturbance of sight, due partly to the increased lacrymation and partly to the countless morsels of mucus that cover the cornea.† Gill⁴⁸

* The reader must bear in mind that the right eye was still bandaged during the time that the glass (plus 0.5 D. sph., in modern notation) was held in front of the left eye. That is to say, the child was able to read the smallest type with the latter eye, with or without a glass, notwithstanding the fact that she alleged it to be blind.—Trans.

† Wells (*Diseases of the Eye*, 1869, p. 19), has given an excellent account of the disturbances of sight that are met with in Catarrhal Ophthalmia. "Vision is only so far affected," he says, "that objects may appear somewhat hazy and

quotes, in all seriousness, a case from the *Revue de Therap. medico-chir.*, where obstinate catarrh of the eyes and photophobia came on as a sequel to dental irritation. After removal of decayed teeth, the patient was astonished "to be able to see with his eyes." (Compare with Hutchinson's first case, quoted later.)

If we exclude from the mass of recorded cases those that present such obvious fallacies as the above, we shall find comparatively few remaining pertinent to the present enquiry. The limited space at our disposal, moreover, precludes mention of more than a tithe of the numerous communications that have been published on this subject.

Most authors quote the dictum of Beer⁵¹: "Among the rarest causes of amaurotic feebleness of sight, we must include a consensual neurosis of the eye, due to a decayed molar tooth of the upper jaw"; and they instance his statements about amaurosis following wounds of the eyebrow as proof that such a thing as reflex blindness really exists.*

A still earlier author, Richter,⁵² narrates the history of a lady who, after blindness of some years' duration, recovered her sight, though for a few seconds only, upon a tooth being

indistinct, as if seen through ground glass, which is due to the presence of a little of the discharge upon the cornea. The patients also notice *muscæ volitantes* in the shape of strings of fine beads floating through the field of vision these are produced by mucus and little flakes of epithelium being washed over the cornea by the movements of the eyelids. For the same reason, the flame of a candle appears to be surrounded by a coloured ring, which, however, also disappears when the lids are rubbed."—Trans.

51. Beer. *Lehre von den Augenkrankheiten*, 1817, B. ii., p. 452.

52. Richter. *Anfangsgv. der Wundarzneykunst*, 1795, Bd. iii., p. 428.

* It is an ancient belief that wounds of the eyebrow and eyelids may give rise to amaurosis. It was held that blindness resulted from reflex irritation proceeding from branches of the fifth nerve distributed to the injured parts. Beer (*Lehre von den Augenkr.*, 1813, v. 1), was one of the principal advocates of this theory, and he recommended, as a means of cure, a section of the nerve supposed to be implicated. Modern pathological research has shown, however, that the amaurosis is due in reality to fracture of the cranial bones and injury of the optic nerve.—Trans.

drawn. It seems almost a pity to be compelled to point out that such hallucinations not uncommonly occur without any extraction of the teeth. Gill (*l. c.* p. 430), thus quotes the foregoing case: "A lady, several years blind, recovered the power of vision a short time after the extraction of a decayed tooth."

Caffe ⁵³ communicated the following extraordinary case:—A lady possessed a carious upper molar. Whenever food collected in the cavity of this tooth, the corresponding eye immediately became amaurotic, a condition which disappeared as soon as the offending particle was removed.

Sir Thomas Watson ⁵⁴ records the following story of a doctor's son, who lost the sight of one eye two or three times in succession, without it being possible to discover morbid changes in the organ. Upon each occasion the loss of sight disappeared after the removal of teeth, an operation rendered necessary by their irregular disposition. Dr. Ashburner's opinion is quoted to the effect that such cases are not uncommon. (!)

Hancock ⁵⁵ records the following instance of amaurosis: A lad, eleven years of age, discovered, upon awaking one morning, that he was completely blind. A month later, the patient was taken to the Royal Westminster Ophthalmic Hospital. His pupils were then dilated, fixed, and insensitive to light, and it was found, upon examination, that his teeth were much crowded together, the maxilla being too narrow to contain them properly. Accordingly, a dentist, who was called into consultation, removed six molars—two permanent and four temporary. On that evening, the lad could distinguish light from darkness, and next day could recognise

53. Caffé. *La lancette franc.*, 1839, p. 94.

54. Watson. *London Med. Gazette*, Feb'y. 5, 1841. (Mentioned, also, in Watson's *Lectures*, Vol. I, p. 344, 3rd ed. Trans).

55. Hancock. *The Lancet*, 1859, Vol. i, p. 80.

objects. After that, sight returned so quickly that the patient was discharged cured eleven days later. The entire treatment, excluding extraction, had consisted of two doses of aperient medicine.

Mackenzie⁵⁶ published a batch of striking cases of this kind culled from his own experience and from that of others.*

Passing next to latter-day writers, we at once hit upon Hutchinson's⁵⁷ series of four cases, of which, however, only three relate to amblyopia of dental origin. Not one of these cases, in my opinion, can be considered as due to dental irritation, for they can all be assigned to other and more natural causes.

The facts of the first case, entitled "Neuralgia of the eyeball, cured by the extraction of a stump," are as follows:—

A woman, aged 28 years, had suffered for about a month from pains in the left eye and in the forehead. The eye, watery, irritable, and intolerant of light, could discern large capital letters, but accurate trials of sight could not be carried out because of the photophobia. The patient made no complaint of toothache, but examination disclosed a carious molar in the upper jaw, which was tender on pressure. After extraction of the tooth, all the symptoms at once vanished: the eye, no longer irritable, could read well.

In the foregoing case, then, extreme irritation of the eye, weakness of sight, and photophobia were induced by irradiation along the first branch of the fifth nerve. As shown by the history, however, Hutchinson did not allow himself to be misled as to the true significance of these symptoms.

56. Mackenzie. *Traité prat. des maladies des l'œil*. Trad. par Warlomont et Testelin 1857, Bd. ii., p. 845.

57. Hutchinson. *Royal London Ophthalmic Hospital Reports*, 1865, p. 381—8.

* The English reader will find these cases described in the fourth edition of Mackenzie's "Diseases of the Eye," pp. 1077—78.—Trans.

That genuine amblyopia of reflex character was not present in the other cases, may be gathered from a critical examination of the first, and apparently the most conclusive, of the series. With all due respect to its distinguished author, we may at once proceed to discuss the case, and to examine it in all its bearings.

Mrs. S., 46 years of age, stout, florid, and in good health, consulted Hutchinson on account of a tumour developing in connection with the left masseter muscle. The left eye, which diverged considerably, was almost completely blind. The patient stated that, three years before coming under notice, she had suffered from a swelling of the right upper gum, for the relief of which leeches were repeatedly applied. Rather suddenly, the left eye became blind, a state of affairs for which the patient held the repeated leechings responsible. Later on, the stump of a tooth was extracted, and forthwith the swelling of the gum disappeared ; sight, also, improved somewhat, although she never became able to see more than the largest objects. Ophthalmoscopic examination revealed nothing abnormal ; the disc possessed its proper colour, and was not cupped. The eyeball was not hard.

We may conclude from the text that Hutchinson derived his information from the patient herself, whose statements might or might not be trustworthy. The following alleged facts, then, depend upon such evidence alone : (1) that, prior to an affection of the right upper gum, the sight of the left eye was good ; (2) that the sight of the left eye became suddenly affected after the dental trouble had made its appearance ; (3) that, after removal of a stump, sight, previously almost lost, improved a little, although never reaching the normal standard. Now had the sight of the left eye been really good three years before Hutchinson saw the patient, there must have been at the time of examination some visible alteration of the optic disc, such as slight pallor.

The reason for this statement is simple. The chain of reflex irritation would be broken by extraction of the stump ; and continued weakness of sight could come about only in presence of structural changes in the eye, which would express themselves in an altered condition of the papilla, if not by changes in the retinal vessels. Yet, upon Hutchinson's showing, such changes were not present. Further, it would be a most unlikely thing for a right-sided dental affection to cause disease of the left eye, sparing at the same time the eye of its own side. Hutchinson makes the significant statement that the eye diverged considerably. Now we know that such deviation generally occurs in eyes amblyopic from birth or from early childhood, and it is also known that such eyes may manifest absolutely no signs of disease, either internally or externally. The above facts seem altogether to negative the conclusions drawn by Hutchinson as to the pathogeny of the case, which we incline to regard as an example of congenital amblyopia, *i.e.*, that the defect in sight was present before the swelling of the gum and the application of leeches. Even if we do not admit that the patient was actuated by some grudge towards her former doctor, it is highly probable that she belonged to that numerous class of persons who in advanced life, discover (by accident or from the oculist) for the first time that the sight of one eye has been defective since birth.

Wecker, ⁵⁸ a no less distinguished author, translates, without criticism, Hutchinson's three cases for Delgrado, the Madrid oculist, in the *Annales d'oculistique*. To them, he adds another example of complete amaurosis drawn from his own practice, of which hysteria may well have been the explanation. The case was as follows :

Madame Ch., a sempstress, 28 years of age, had suffered

58. Wecker. Ann. d'ocul. 1886, p. 134.

for a long time from severe pains in the upper jaw. Upon one occasion, after a violent paroxysm had almost abated, the patient found that she had quite lost the sight of the right eye. Foot baths and blisters led to no result, and the patient resumed her usual occupation. Fourteen days later, severe pain set in upon the left side of the jaw, after the cessation of which she was horrified to discover that she was completely blind in both eyes. Next day, she was brought to the clinic, where her condition was found to be as follows: the gait was that of a blind person, and it was doubtful whether she possessed even perception of light; the semi-dilated pupils were irresponsive to light; the fundus oculi was normal. Simulation seemed out of the question in the case of Madame Ch., as she had three children of tender age to provide for. Three days later, by Wecker's advice, chloroform was administered, and five decayed teeth extracted from the left side. As soon as consciousness was recovered, the patient stated that the sight of the left eye had returned, and when examined five days later the vision of that eye was perfect, while the right possessed accurate perception of light. A severe inflammation of the right side prevented immediate extraction of three other carious teeth, an operation which was finally performed seventeen days later. Almost immediately, the functions of the right eye were regained, and examination a few days later demonstrated normal sight in both eyes. During this time, pills of valerianate of zinc had been taken, but Wecker does not think they had anything to do with the happy issue of the case.

Delgrado, (*ibidem*) replying to Wecker, quotes the opinion of his teacher, Desmarres,⁵⁹ to the effect that, while amblyopia not infrequently results from decayed teeth, amaurosis is never observed. Nevertheless, Delgrado accepts Wecker's

⁵⁹. Desmarres. Tr. des Maladies des Yeux, 1858, II. Edit., Bd. iii., p. 584.

case as evidence to the contrary, and records the following* additional observation : a lad, 11-12 years of age, was brought from Toledo to consult Delgrado. The patient's sight had been for some time defective from choroidal mischief, but, coincidentally with an attack of toothache, it had failed to an alarming extent during the last 15 days: amblyopia was present, and the boy was unable to discern the outspread fingers. After removal of two decayed molars, sight improved to such an extent that the lad could read the smallest characters of Jaeger's test-type.

As regards this case, it is of course possible that the patient had exaggerated his symptoms, as children often do, in order to excite compassion and sympathy.

Alexander⁶⁰ records a remarkable case, which may be thus epitomised :

The sight of a man, aged 26 years, had failed continuously for five months, at the end of which time the right eye saw Jaeger No. 10 with difficulty and possessed only $\frac{1}{16}$ normal sight, while the vision of the left eye equalled $\frac{1}{7}$ and Jaeger No. 6 fairly well. Media clear ; fundi normal, save for as somewhat hyperæmic optic disc. Blood-letting and foot-baths produced no improvement. Nine days after his reception, the patient complained of a violent toothache, which had robbed him of sleep during the whole of the previous night. The pain originated in the first molar of the right side, and extended over the whole of the right half of the head and face. Such pain, it should be noted, had been present on former occasions, but no particular attention had been paid to it. Examination of the eye disclosed these results : right eye reads Jaeger No. 15 with difficulty and recognizes Snellen No. 60 ; left eye reads Jaeger No. 6, as formerly. The decayed

60. Alexander. Klin. Monatsbl. für Aug., 1868, p. 42.

tooth was extracted, and a week later the sight of the right eye was \S , that of the left eye being normal.

Galezowsky communicated the following case to the *Societe francaise d'Ophthalmologie* in 1886 :

A lady lost the power of reading, upon a tooth being stopped. The filling was removed, when the patient recovered use of the eye. The tooth was again stopped, and sight was again lost. A definite cure was finally obtained by removal of the tooth.

Wit de Witchal⁶¹ saw blindness of twelve years' standing quickly cured after the removal of a first bicuspid tooth. A fistulous opening was present in the corresponding alveolus. Details are not given as to the exact ophthalmoscopic condition of the patient.

Of a series of eight cases of "Damaged sight due to dental diseases," published by Keyser,⁶² six were instances of amblyopia.

Further cases of a similar kind have been communicated by Salter,⁶³ Sirletti,⁶⁴ Lardier,⁶⁵ Mengin,⁶⁶ Marshall and Butler,⁶ Widmark,⁶⁸ and by several other dentists and oculists. In spite of their titles, many of these cases have, however, little or nothing to do with amaurosis or amblyopia. They deal for the most part either with conditions that more or less interfere with exercise of vision by the patient or with the application of

61. Witt de Witchel. American Journ. of the Medical Sciences, 1868, p. 382.

62. Keyser. The Dental Times, Oct, 1870, and Virchow-Hirsch's Jahresbericht, 1872, Bd. ii., p. 575.

63. Salter. Med. Chir. Transactions, 1863, p. 355, and Guy's Hospital Reports, 1868, Bd. xiii., (compare Wedl, p. 170).

64. Sirletti. Dental Cosmos, 1878, p. 685.

65. Lardier. Rec. d'ophth., 1875, p. 86.

66. Mengin. Rec. d'ophth., 1878, p. 324, and 1880, p. 20.

67. See Deutsche Monatschrift für Zahnheilkunde, 1884, p. 87

68. Widmark. The Lancet 1886, Bd., ii. p. 88.

tests by the surgeon, such as spasm of the orbicularis, photophobia, copious lacrymation, vertigo compelling the patient to close his eyes, and the like.*

* Lately I have had to deal with an instructive case of amaurosis, which, if not simulated, was probably of hysterical nature.

A girl, 15 years of age, was brought to me on Feb. 14, 1894, with the following history:—She was awakened one morning, some nine months ago, by violent pain behind the left ear. At the same time she found that the sight of the left eye was defective, that objects looked too small, horses resembling dogs, and so forth. A fortnight later, she attended one of the London Ophthalmic Hospitals, where she has been treated ever since, although without any benefit as regards the sight of the left eye.

The patient volunteers the statement that she is always “very near to tears,” and she gives a distinct account of other hysterical symptoms, such as a ball which rises in her throat (*globus*), and painful spots about the scalp and head.

R. V. 6/12 & No. 2 Jaeger.

L. V. No perception of light.

Pupils of medium size, equal and active.

Beyond a small congenital crescent of each optic disc, the fundi were quite normal.

Knee-jerks present, and not exaggerated; ankle-clonus absent.

No special test instituted for the detection of simulation.

An absolutely good prognosis given, and the patient handed over to Mr. J. H. Burroughs, for the purpose of having some decayed teeth extracted. The same afternoon nitrous oxide was administered, and the left upper first molar, together with the left lower first molar, removed.

February 15th. The left eye is now able to tell light from darkness and to distinguish movements of the hand. According to the girl's statement, the improvement in sight was noticed as soon as she recovered consciousness from the aræsthetic administered yesterday. As to further treatment, a needle puncture was made in the skin of the left temple, and the patient informed that a potent drug was being thrown into the circulation.

Feb. 20th. L. V. 6/36 and 12 Jaeger, fluently.

Feb. 24th. The girl says that an aching pain affecting the right brow set in on the 20th, and that the sight of the right eye commenced to fail two days ago.

R. V. 6/36 and 8 J.

L. V. 6/18 and 10 J.

An “injection” made into each temple.

Feb. 27th. Gas again administered, and the first right upper molar and two roots of the first right lower molar extracted.

Examined after the operation: R. V. 6/36, L. V. 6/12 ij letters. The visual field for white contracted on both sides; indeed, as regards the right eye it extended only 100°—15° from fixation point. Colour vision normal. No ophthalmoscopic change.

Thus far the cases quoted have referred to simple, that is undefined, amblyopia. But Metras,⁶⁹ one of Galezowsky's pupils, goes further, and particularises on the matter. He records two examples of *Asthenopie nerveuse*, in which the seat of disease must have lain in the retina, since the accommodation was perfect. Both were cured by the removal of decayed teeth. Mengin,⁶⁶ another of Galezowsky's pupils, publishes an analogous case. This nervous amblyopia appears

March 3rd. Condition of eyes unaltered.

March 10th. The patient, who was led into my consulting room, avers that, on waking yesterday, she discovered that she was absolutely blind. On the other hand, the lady in charge of the case, states that yesterday morning, when the child thought nobody was looking, she was observed to arrange spoons in the breakfast cups.

Even perception of light denied. The pupils, although small, are equal and active. Fundi normal. Both eyes are obstinately directed downwards and to the right. When told to look at her own outstretched hand, the girl looks everywhere else. Punctures repeated.

March 15th. The patient walks unaided into my room, and states that the sight returned suddenly on the 13th instant, *i.e.* two days since. R. V. $\frac{6}{8}$. L. V. $\frac{6}{4}$. The visual fields are concentrically contracted to within 5 degrees of the fixation point. Fundi normal; pupils equal and active. Punctures repeated.

March 28th. The patient to-day complains that objects "look small," and that she is suffering from pain in the brow.

April 4th. The sight of the left eye has again failed to some extent. R. V. $\frac{6}{8}$, L. V. $\frac{6}{8}$. Normal fundi. Pupils equal and responsive to light and to accommodation. Colours readily distinguished. Visual field for white as already noted.

After the above note was made, the patient was lost sight of.

The foregoing history illustrates the *post hoc ergo propter hoc* fallacy that underlies many cases of so-called dental amblyopia. A neurotic patient, we will suppose, without any obvious reason loses the sight of one, or it may be, of both eyes. As a last resource, carious teeth are extracted, and sight is forthwith regained. It is argued, therefore, that the amblyopia results from a dental reflex, which is broken by the removal of its originating tooth. Unfortunately for this assumption, one knows that such cases may be cured in a variety of ways, as by painful faradism, suggestion, and so forth. In point of fact, it is highly probable that the strong mental impression made by the operation, or even by the administration of an anæsthetic, has more to do with the result than the interruption of a more or less shadowy dental reflex.

Trans.

69. Metras. Rapport path. de l'œil et des dents par action reflex. Thèse de Paris, 1873.

to be due to an exalted sensibility of the retina, whereby its functions became quickly exhausted. To that extent, then, it is a more intelligible affection than simple amblyopia. This form of asthenopia is closely related to, if not actually identical with "Anæsthesia Retinæ" the symptoms of which are as follows :—sensitiveness to dazzling light ; lowered visual acuity (more apparent when the examination is conducted under reduced illumination) ; concentric contraction of the field of vision (which varies in extent from time to time) ; and negative ophthalmoscopic signs. Mengin (*loco citato*) gives a careful account of just such a case in a dress-maker, 34 years of age ; while Teierlink's ⁸ fourth case, which he classes as "amblyopia irritativa," and in which central and peripheral defects of sight were noted, appears to belong to this class. I have recently had the opportunity of observing anæsthesia of the retina in a boy. In that case, fully described below, the ocular symptoms were associated with extreme sensibility to pressure of the whole left half of the head, i.e. from the lower jaw to the vertex. These are the facts :

A boy, aged eleven years, suffered from slight photophobia and, when placed three metres from Snellen's test-type, declared that he was unable to distinguish even the largest letters. After I had promised him a piece of money, he read (with difficulty and frequent breaks) $\frac{3}{8}$ with the right and $\frac{3}{6}$ with the left eye, but neither line was perfectly seen. He then complained of red specks upon the test-type. The right visual field was normal in its extent, but the field of the left eye was considerably curtailed in a downward and outward direction. Results of ophthalmoscopic examination negative ; considerable hypermetropia noted. Investigation directed to the teeth disclosed the presence of a fragment of a milk-tooth, which was very tender, wedged in between the first and second molars of the left half of the lower maxilla. The neuralgia, red sight, and photophobia disappeared as soon as

this fragment was removed, an operation attended with little difficulty, since it was only loosely attached to the gum. Fourteen days later, the lad again presented himself, when the condition was as follows :

Vision of right eye = not quite $\frac{6}{12}$ Hm. $\frac{1}{48}$ V. = $\frac{6}{9}$

Vision of left eye = not quite $\frac{6}{12}$ Hm. $\frac{1}{60}$ V. = $\frac{6}{9}$

The right supraorbital nerve was irritable, on that side the second molar of the lower jaw was coming through the gum. The fields of vision were normal.

The so-called Anæsthesia Retinæ is *par excellence* a reflex trouble, which, generally speaking, attacks women and children. It is concerned with irritation rather than with depression or the retinal functions, and is often associated with trauma or with nervous symptoms, such as hyperæsthesia of the cutaneous nerves, and the like. Now it is precisely this Anæsthesia retinæ which has furnished the largest contingent of cases to the literature of dental amblyopia. But in consequence of superficial examination, not always conducted in accordance with strict scientific principles, the exact nature of the disease has been overlooked, and the cases described as instances of simple amblyopia.

(b) THE OCULO-MOTOR NERVE.

These functional disorders take one of two forms, namely, (a) paralysis, or (b) spasm of the various muscles supplied by the third nerve. A complete paralysis of that nerve, by the way, has not hitherto been observed.

With regard to the intra-ocular branch of the nerve, mydriasis* from paralysis of the sphincter pupillæ has been observed as an outcome of dental trouble by Teierlink,⁸ Desmarres,²² Mengin⁶⁶, and Ely.⁷⁰ Removal of diseased teeth

70. Ely. The Medical Record, 1882, p. 258.

* A condition, which may be called *Spasmodic Mydriasis*, is often seen in children. It usually affects one eye, is of sudden onset, and owns no obvious cause, and although as a rule it speedily subsides, it may persist for weeks, and is apt to relapse. Accommodation may or may not be involved. For instance,

quickly caused the mydriasis to disappear. A dilated pupil begets dazzling, and thus, to some extent, reduces acuteness of vision ; the combination of these two symptoms may cause great discomfort to the patient. Furthermore, the ciliary muscle, also innervated by the third nerve, generally participates in the paralysis, so that accommodation becomes affected. This implies that sight for near objects is impaired in Hypermetropes, Emmetropes, and, to a slight extent, even in Myopes. There can be no doubt that many of the less accurately recorded examples of "Amblyopia" were due in reality to paralysis of the sphincter pupillæ and of the ciliary muscle.

in the following case both cycloplegia and mydriasis was present.—F. H., 12 years of age, a girl of excitable temperament, was noticed, on December 31, 1893, to have her left pupil widely dilated. She was an inmate of the Ophthalmic School, and, at the time mentioned, was using a certain ointment. It was at first thought that by some mistake atropine had been used in compounding the medicament. The ointment introduced into the eyes of other children exerted, however, no mydriatic action ; moreover, one pupil was alone dilated, whereas the remedy had been used to both. On Jan. 20, 1894, these notes were made: the pupil of the left eye, which is 8.5 mm. in diameter, has been dilated for twenty days. It possesses absolutely no reflex, either direct or indirect, nor does it act on convergence. Right pupil is 4 mm. in diameter, and responds to light and to accommodation. R. V. $\frac{6}{9}$ and No. 1 J.; L. V. $\frac{6}{24}$ and No. 16 J. My colleague, Mr. Sidney Spokes, extracted two teeth, which were carious, although not painful. Five days later, condition altered. Reads with left eye No. 16 J., but on the addition of a plus 6D lens deciphers J. No. 1. Jan. 31st, left pupil motionless and as large as ever. Reads, however, J. No. 1 without any glass: V. $\frac{6}{9}$. + 1.5 D. sph. $\frac{6}{8}$. Two days later, the left pupil was noticed to be somewhat smaller, and to react slightly to light. On the following day, however, the pupil was again widely dilated and motionless, while V. $\frac{6}{60}$ and No. 18 J. After a similar relapse, the pupils finally became equal in size on March 30, 1894, on which date the sight of each eye was normal.

The fact should be added that the patient, who was tested before the onset of the mydriasis, had 1.5 of hypermetropia in each eye. Further, that during the period covered by the foregoing history, the visual field of the left eye was markedly contracted, that of the right being of normal extent. Colour sense unaffected. Fundus normal.

In this case, then, notwithstanding the removal of decayed teeth, the mydriasis remained almost unaltered for a considerable period of time, and ultimately went away of its own accord.—Trans.

According to Hermann Schmidt,⁷¹ however, failure in accommodation is quite a common occurrence, and that altogether apart from dilation of the pupil. He examined 92 dental patients, and found that 73 of them possessed accommodation, the range of which was below normal, either in both eyes or in the eye of the same side as the affected tooth. Of 31 cases, in which the reduction differed in the two eyes, the greater limitation was found in 30 instances to be upon the side that corresponded with the diseased tooth. In 51 cases the contraction was of equal extent in both eyes; 9 persons had bilateral dental disorders. The paresis of accommodation declared itself most frequently in youth; indeed, it was seldom met with after the 30th year. Among 62 patients, whose ages ranged from 10 to 25 years, reduction of accommodation was in 35 instances equal to a lens of 5D, and upwards. Schmidt considered that the vaso-motor nerves of the eye became involved by the reflex, and that increased intra-ocular pressure was thereby brought about; the latter factor he held responsible for the diminished range of accommodation.

Schmidt's observations are remarkable in many ways. It is curious, for instance, that paresis of accommodation was so common, paresis of the sphincter so rare; that the marked reduction of accommodation did not embarrass the patients; and, finally, it is difficult to see why those 30 years of age and upwards should enjoy almost complete immunity.

Priestley Smith⁴², conducted some control experiments upon patients who were suffering at or about the time from tooth-ache. In one case only, out of the sixteen examined, did that observer demonstrate any reduction in accommodation.

It becomes impossible, therefore, to accept Schmidt's statements as they stand; and, in point of fact, his observations leave much to be desired. Leaving wholly aside any considerations as to whether odontalgia can during the paroxysm

71. Schmidt. Arch. für Ophthalm., 1868, Bd. xiv., 1 Abth., p. 107.

cause actual paresis of accommodation, it is obvious that a patient racked with toothache can be scarcely expected to use his ciliary muscle to the best advantage. Schmidt himself tells us that he often demonstrated the existence of surplus accommodation, and, further, that repeated examinations of one and the same patient, conducted during the continuance of the pain, frequently yielded different results with regard to the position of the near-point.

Schmidt's observations must be regarded as incomplete, moreover, inasmuch as he neither paralysed the ciliary muscle with atropine, nor did he ascertain with the ophthalmoscope the condition of refraction, i.e., the position of the distant-point of the eye. Atropinisation, it is true, might have been possible in but few of the patients, owing to the lasting effects of the drug. But the ophthalmoscopic determination of refraction was therefore all the more necessary, since paresis of the ciliary muscle might at any moment yield to spasm. The latter condition would conceal a latent hypermetropia, or might even appear to convert emmetropia into myopia of considerable degree.

As noted before Schmidt alleged that the reduction of accommodation was limited almost exclusively to young persons. Thus most instances were observed in patients from 10 to 15 years of age, while from 15 to 30 years the condition gradually declined in frequency. Among 13 individuals whose ages ranged from 30 to 40 years, only six slight cases were noted. In six patients, 40 years of age and upwards, the accommodation was diminished once only; in three of these people it was stated, indeed, to be "better than normal." These results may be explained by the fact that spasm of the ciliary muscle is constant in young persons, whether they be hypermetropic, emmetropic, or even slightly myopic. The omission of ophthalmoscopic examination accounts for Schmidt's failure to exclude this obvious source of error. One further point may

be mentioned. Schmidt states that even experienced observers may differ $\frac{1}{4}$ to $\frac{1}{2}$ inch in their estimate as to the position of the punctum proximum. Such an error, however, would make little appreciable difference in the range of accommodation except when the near-point lies very close to the eye, as, for instance, in young subjects.

To illustrate the influence of toothache upon the accommodation, Schmidt gives a detailed description of the two following cases.

1. Fraulein Elise L., nineteen years of age, came to the out-patient room suffering from violent toothache of three days' duration, which, according to her statement, was "enough to drive her mad." The face was markedly congested, while its right half was tender to pressure. The eyes were injected, a remark that applies especially to the right one. The third molar of the right upper jaw was found to be the starting point of the pain. Myopia 1-80; slight divergent strabismus of the left eye; punctum proximum, 4 in. The pulp of the carious tooth was destroyed by means of arsenical paste, with the consequence that the neuralgia disappeared. On the following day the patient being quite free from pain, the near-point stood at $3\frac{1}{4}$ in. (In spite, therefore, of three days, violent pain, only $\frac{3}{4}$ difference was observed between the trials, and that is about the same variation as obtains under normal conditions). Later on, odontalgia returned, although not so violently as before, and the near-point was found to lie $3\frac{3}{4}$ in. to 4 in. from the eyes.

2. Louis P., 20 years of age, had suffered for about a month from considerable pain, caused by caries of the second lower molar of the right side. Acuteness of vision: left eye, 1, right eye, somewhat less. Both eyes, myopia $\frac{1}{60}$. Near-point: left eye, $3\frac{1}{2}$ in., right eye, $6\frac{1}{2}$ in. After destruction of the pulp, toothache was relieved. On the next day, the near-point of left eye lay at 4 in., that of the right eye at $5\frac{1}{2}$ in.,

the accommodation of the left eye thus showed a reduction of $\frac{1}{8\frac{1}{2}}$, while in the right eye an augmentation of $\frac{1}{3\frac{1}{6}}$ was observed. It will be noted that the accommodation in the left eye was normal during the paroxysm of pain: and twenty hours after the disappearance of the latter, the diminution observed was somewhat greater than the augmentation noted in the right eye. Nevertheless, Schmidt finds this case particularly instructive.

Last'y, a serious defect in Schmidt's investigations lies in the fact that, of the 73 patients in whom a diminished range of accommodation was demonstrated, so few as eight presented themselves for further examination. Although five of the latter showed improvement as to their symptoms, yet Schmidt relates in detail two cases only, and those, as already hinted, can by no means be regarded as conclusive.

In fine, investigations should be made as to whether accommodation is really weakened by toothache, and, if so, in what proportion of cases; further, as to whether such a symptom is, or is not, independent of the patient's volition. I may add here that some control-experiments, lately instituted by me, yielded negative results.

Myosis (due to spasm of the sphincter pupillæ) is sometimes caused by dental irritation, although mydriasis (due to paresis of the sphincter) is much more commonly met with. In a case described by Mengin,⁶⁶ contraction of the pupil as well as spasm of the accommodation were noted. Also in Teierlink's case of irritative amblyopia, alluded to previously, myosis was observed.

With regard to the extra-ocular branches of the third nerve, we find recorded several cases of ptosis, which rapidly recovered after the removal of diseased teeth (Hancock,⁷² Fox, Gaine¹⁴, Power³², and Faucher⁴¹.) For my own part, I was once acquainted with a lady, who, whenever she

72. Hancock. The Lancet, 1859, Bd. I., p. 80.

became pregnant, developed marked ptosis in one or the other eye.

Terrier ⁷³ described contraction of the superior rectus, external rectus, and inferior oblique of the right eye in a hysterio-epileptic girl, 21 years of age, who had several decayed though not painful teeth. Photophobia and blepharospasm were present, so it is possible that the upward and outward deviation of the eye was due to those conditions rather than to a primary affection of the muscles. The ocular disorder, which had existed for four months, disappeared a few days after removal of the diseased teeth.

Ely⁷⁰ observed slight paralysis of the right internal rectus and of the ciliary muscle arising from dental irritation, and Mummery ⁷⁴ and Neuschuller ⁷⁵ have described similar cases. Mummery's case, detailed below, was a veritable museum of wonders.

A young lady suffered from pain in the left side of the face. The neuralgia was caused by a molar which had been stopped. The eye was divergent, a condition that vanished after extraction of the tooth. Ten months later, pain again made its appearance, entailing this time ptosis and mydriasis of the left eye ; it was also noted that a tuft of hair upon the temple had turned grey. It was found, upon examination of the mouth, that a neighbour of the tooth previously drawn had become carious, and after its extraction the ptosis and the mydriasis disappeared, although the gray tuft of hair showed no alteration.

It is instructive to compare with the foregoing case that recorded by Mengin.⁶⁶ A woman, 49 years of age, suffered from face-ache and from contraction of the internal rectus. The latter symptom gave rise to homonymous diplopia. The

73. Terrier. *Journ. de Med. et Chir. prat.*, 1875, p. 549.

74. Mummery. *Dental Cosmos*, 1880, p. 561.

75. Neuschaller. *Rec. d'ophth.*, 1889, p. 657.

stump of the first upper premolar tooth of the right side, which was scarcely sensitive to percussion, was extracted. Two days later, both the face-ache and the diplopia had completely disappeared.

(c) THE FACIAL NERVE.

That the orbicularis muscle, which is supplied by the facial nerve, participates in tic douloureux is well known. Mengin⁶⁶, reports a case of *Tic des deux paupières* of four months' duration, in a girl of nervous temperament, eleven years of age. The right superior canine and the second molar teeth, which, although decayed and pulpless, were scarcely sensitive to pressure, were removed; and eight days later, the tic had disappeared.

On the other hand, Salter⁶³ described a case of facial paralysis following upon a painful caries of an upper wisdom tooth.

Ely⁷⁰, records "paresis of the orbicularis with irregular spasm of the ciliary muscle and astigmatism and monocular diplopia," all of which symptoms vanished forthwith after extraction of an upper molar and evacuation of the abscess that lay at its root.

RÉSUMÉ.

1. Dental affections may cause catarrh of the eyes reflexly, a process observed especially during the first dentition. Catarrh may also be one of the symptoms accompanying a swollen face of dental origin.

2. Purulent inflammation may spread by continuity from the periosteum of the alveolar process to the orbit, and there set up cellulitis. In many cases the latter malady has entailed ruin of the eyes, from atrophy of the optic nerve or from phthisis bulbi; even death itself has occasionally taken place.

3. A reflex, originating from the teeth, may cause certain functional disturbances in the eye, by affecting the orbital

branch of the trigeminus, the optic nerve and retina (light-perception apparatus), the oculo-motor, or the facial nerve.

4. Affection of the orbital branch of the trigeminus, which is brought about by irradiation, causes neuralgia of its several branches and exalted sensibility of the skin to which they are distributed. It produces, moreover, pains in the eye and in the orbit, together with copious lacrymation. Swelling and redness of the conjunctiva are secondary effects, due partly to excitation of the vaso-motor nerves.

5. Implication of the optic nerve and retina manifests itself by photophobia (which in its turn produces blepharospasm), by asthenopia and anæsthesia, by amblyopia (?), and by amaurosis (?). Also by super-sensitiveness as well as by dulness of the optic nerve and retina respectively, unaccompanied by ophthalmoscopic changes.

6. Affections of the oculo-motor nerve generally show themselves in the form of paralysis of the two intra-ocular muscles, namely, the sphincter of the pupil and the ciliary muscle. In a few instances, however, spasm has been observed. The external voluntary muscles of the eye may, also, be implicated. This is particularly the case as regards the levator palpebræ superioris and the rectus internus, the latter of which is of course connected synergetically with the intra-ocular muscles. Of spasm of the rectus superior, and the obliquus inferior, a single problematical case has been recorded by Ferrier, who further stated that the rectus externus, supplied by the sixth nerve, was also involved. No affection is mentioned of the rectus inferior, supplied by the oculo-motor nerve, nor of the obliquus inferior, innervated by its special nerve, the trochlearis.

7. Affections of the facial nerve usually take the form of irritation, evidenced by tic and blepharospasm, seldom that of palsy.

8. Ocular troubles of reflex origin are completely and

rapidly cured by extraction of the tooth from which the vicious impulse radiated.

9. In a few instances, reflex eye maladies have been observed to follow the extraction of a tooth. Such cases were, however, quickly cured.

10. No explanation has yet been given of the curious fact that a peripheral excitation of the trigeminus, often trifling and scarcely noticed by the patient, is capable of causing palsy of other nerves, both motor and sensory.

11. It remains yet to be proved that inflammation of the eye, apart from symptomatic conjunctivitis, can be produced by a dental reflex. Statements to the contrary are not supported by sufficient proof.

DENTAL DISORDERS CONSEQUENT UPON AFFECTIONS OF THE EYE.

At the commencement of this paper it was remarked that actual dental disease caused by affections of the eye had not been observed. At the same time, the fact should be mentioned that the passage of a probe down the nasal duct, which is fed by the anterior dental nerve, not infrequently gives rise to pain in the anterior molar teeth.

Galezowsky³⁷ records the following case:—A porter suffered from rheumatic iritis of the left eye. In the second week of its course, the malady was complicated by exceedingly violent neuralgia of the teeth. Before Galezowsky saw the patient, a dentist had been consulted, and two sound

* In this connection, the following interesting case, reported by Ducellier, may perhaps be mentioned. A bullet, weighing 7 grammes, lodged in a patient's right orbit. Little uneasiness was felt in the orbit, but severe pain was experienced in the right superior maxilla, and especially in the canine and incisor teeth. That these symptoms were the result of pressure by the bullet on the infra-orbital nerve was proved by the effects of treatment: the foreign body was removed, and the dental pain, along with other symptoms, at once subsided. (Rev. d'oph., 1877, p. 355).

teeth were removed, without however assuaging the pain. The neuralgia disappeared with the cure of the iritis. And when the iritis relapsed, five months later, similar pains were experienced in the teeth.

Javal ⁴⁵ speaks of a case of glaucoma in which toothache was a prominent symptom. After the performance of an iridectomy, the odontalgia vanished.





